

YELLOW FEVER IN THE CONTINENTAL UNITED STATES DURING THE NINETEENTH CENTURY*

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THE history of yellow fever in the United States presents an interesting problem to students of epidemiology. The disease first struck on the Atlantic coast in the 1690's, reached a peak around 1745, diminished until 1760, and then disappeared until the closing years of the century. In the 1790's the fever suddenly reappeared, striking at ports from Boston on the northeast coast to New Orleans on the Gulf of Mexico. Severe outbreaks hit Boston, New York, and Philadelphia from 1793 to 1805; after this the epidemic gradually subsided. In 1822 the disease flared up for the last time in New York City, an attack which marked the final significant outbreak in the northern states. Henceforth, although cases were frequently introduced into the quarantine grounds, yellow fever never again gained a foothold in the coastal cities of the northeast.

Meanwhile the disease was becoming an ever-increasing problem for towns and cities on the southeastern Atlantic coast and along the entire gulf shore from Florida to Texas. Fortunately, even in the southern states winter temperatures reduced the mosquito population to negligible proportions, and November or December usually witnessed the last of the yellow fever cases. Nonetheless, the disease was reintroduced into the port cities year after year, and rarely did an interval of two or three years elapse without at least a minor outbreak. Periodically the disease assumed major proportions, often destroying from 5 to 10 per cent of the population. The attacks increased in intensity and severity until the 1850's, when a series of devastating epidemics struck every coastal city from Norfolk, Va., to Brownsville, Texas. These

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years mark the peak of yellow fever in the United States. After 1858 the disease slowly subsided, flaring up briefly in the 1870's, but steadily declining in significance until 1905, when a final outbreak in New Orleans was cut short by an effective program of mosquito control.

As already noted, and as John B. Blake has shown, the final series of major yellow fever epidemics to strike the northeastern cities in the 18th century came to an end in 1805, a year in which serious outbreaks occurred in both New York and Philadelphia. Although the disease appeared sporadically in the succeeding years, it did not recur in epidemic fashion until 1819, when it struck at Boston, Philadelphia, and Baltimore. After lingering for three summers in Philadelphia and Baltimore, and making one final visit to New York in 1822, yellow fever ceased its attacks on the states north of Virginia. Infected sailors and passengers were landed time after time, but the quarantine and isolation measures appear to have been effective in keeping the disease in check.

In the coastal area from Virginia southward to Florida and westward along the Gulf coast the situation was quite different. The steady growth of population and the mild climate which enabled the *Aedes aegypti* to survive the winter created a perfect setting for the introduction of yellow fever. With the exception of Charleston, S.C., no major towns had emerged in this area during the colonial period, but by the 19th century the development of the South had produced many urban areas. In 1785 New Orleans, the largest city on the Gulf coast, had a population of only 5,000. Even by 1803 the population had barely reached 10,000. The first yellow fever epidemic occurred in the city in 1796 and struck down 300 people. The disease returned again in 1799 on a comparable scale. Three relatively mild outbreaks developed in the succeeding 10 years, followed by a more severe one in 1811 which killed 500 people.¹

For the next six years New Orleans escaped yellow fever, but the disease returned in full force in the summer and fall of 1817, striking down more than 800 victims. A minor outbreak the following year was succeeded by a major epidemic in 1819. On this occasion the death toll amounted to 2,200.¹ Despite these onslaughts of yellow fever, New Orleans prospered and expanded. By 1820 the population exceeded 27,000, and 20 years later the city had over 100,000 inhabitants. The increasing population, a good part of which was derived from the yearly influx of European immigrants and newcomers from other

sections of the United States, provided ample fuel to feed the epidemic flames of yellow fever. Until the outbreak of the American Civil War, scarcely a year passed without a recurrence of the disease. Moreover, the epidemics steadily increased in virulence and intensity. In the 25 years from 1835 to 1860, the annual number of deaths from yellow fever exceeded 1,000 on no less than 12 occasions.²

In New Orleans, as elsewhere along the southern coast, the peak period for yellow fever came in the 1850's. In four epidemics during this decade, New Orleans lost almost 20,000 people. In one year alone, 1853, the victims of yellow fever numbered between 8,000 and 9,000. In each of the following two summers the disease returned to the city to strike down another 2,500, and, as it had in 1853, to sweep far up the rivers and bayous of the state. Three successive epidemics, from 1853 to 1855, cost New Orleans 14,000 lives, and medical and civic leaders were then convinced that the city would be given a long respite from the pestilence, since the number of susceptible individuals had been reduced to a minimum. Unfortunately, the influx of newcomers and the shifting population of this bustling commercial center during the boom years of the 1850's soon provided raw material for another great wave of infection. The summer death toll from yellow fever in 1856 was 80; the figure rose to 200 in 1857; and the following year another major epidemic developed. When the Board of Health compiled its final mortality figures late in November of 1858, almost 5,000 yellow fever victims were counted among the dead.³

Since the case mortality rate during these major yellow fever epidemics usually ran around 20 per cent, the grim mortality statistics reveal only a part of the tragedy occasioned by these recurrent outbreaks. A death toll of 5,000 represented anywhere from 20,000 to 30,000 cases, an amount of sickness difficult to imagine. During serious epidemics one third or one half of the population was often either sick or dying. Under these circumstances, caring for the sick and burying the dead became a full-time occupation for the remainder of the population.

In New Orleans, as in other 19th century cities, the newspaper editors, municipal officers, and leading physicians often compounded the tragedy by their refusal to face up to reality. Despite appalling casualty lists from cholera, yellow fever, and the perennial summer fluxes and fevers, they stoutly maintained that their city was a veritable health

spa. The only ones falling prey to sickness, they asserted, were strangers and the intemperate and immoral poor. Medical journals and newspapers proclaimed that newcomers could protect themselves from yellow fever if they would only leave during the summer season and not return until the cool temperatures of fall had banished the disease. The editor of the New Orleans *City Directory* early in 1853 expressed the prevailing opinion of civic and professional leaders when he declared that the New Orleans physicians now considered yellow fever to be an obsolete idea.^{3, 4} Ironically, as already mentioned, almost 9,000 of the city's residents died of fever in the five-month period from June to October of that same year.

Aside from their natural tendency toward an optimistic outlook, the newspapers, which were closely tied with the commercial interests, had a vital economic stake in playing down the significance of epidemics. Even a rumor of the presence of an epidemic disease was enough to precipitate a mass exodus and to cause neighboring towns to institute rigid quarantines and blockades against the supposedly infected city. Almost by reflex action, newspaper editors in the 18th and 19th centuries either denied the existence of the first few cases of a communicable disorder or else casually dismissed the danger. Only when the disease had reached such epidemic proportions that concealment was no longer possible would any public admission of the fact be made.⁵

The medical profession was in no position to help the situation. For most of the 19th century, as had been the case since time immemorial, the profession had no real understanding of the causative agents of communicable disease. Yellow fever, like other diseases spread by insect vectors, was as strange and unaccountable in 1853 as it had been since Europeans first encountered it in the 16th and 17th centuries. Without the aid of instruments and laboratory techniques, diagnosis was not always simple. Prior to the Civil War, it was a rare yellow fever epidemic which did not provoke a violent public argument between the attending physicians over the nature of the first few cases. Since a diagnosis of yellow fever was certain to bring down upon the attending physician the wrath of both local newspaper editors and municipal officials, doctors seldom dared make this pronouncement without first consulting with their colleagues. Even a consultation gave no assurance that the question was settled, for other members of the medical faculty were almost certain to question the findings. The result

was that the presence of the disease was rarely made public until the situation was out of hand.

In the New Orleans epidemic of 1853 the City Council displayed an incredible degree of irresponsibility. It had been customary for the council to appoint a temporary board of health at the beginning of each summer, the so-called "sickly season." In 1853 the City Council delayed action almost until the end of July. On July 22 the Board of Aldermen cheerfully adjourned for the summer after tabling a motion to create a board of health, and on July 23 the president of the Board of Assistant Aldermen, S. W. Dalton, a prominent physician, informed one of the newspaper editors that after studying the yellow fever cases closely he was "firmly convinced that the disease at present in our city is not by any means epidemic." The fever was merely sporadic, he thought, and in any case it was restricted largely to immigrants and other new arrivals.⁶ This statement was made in the face of the official weekly burial return, which attributed 417 of the city's 617 deaths to yellow fever.

Realizing the gravity of the situation, Mayor A. D. Crossman summoned the two boards into emergency session on July 25 and pressed them into passing the necessary ordinance creating a board of health.⁷ To appreciate the gross negligence of the city councilmen and the fatuousness of Dr. Dalton's assertions, one has only to glance at the official burial returns published each week in the newspapers. The deaths from yellow fever for the week ending July 16 amounted to 204. The following week the figure rose to 429. By the time the City Council reluctantly created a board of health, the yellow fever death toll had reached almost 100 per day. It should be added that after complying with the mayor's request, the City Council adjourned for the summer and most of its members joined the exodus from the stricken city.³

Meanwhile the death rate continued its remorseless climb. During the week ending August 14, no less than 1,526 New Orleanians perished, and the figure rose to 1,628 in the following week. Early in the month the city faced a major crisis when an acute labor shortage made it impossible to secure gravediggers. The New Orleans newspapers scathingly denounced the situation, and wrote appalling descriptions of conditions at the graveyards. These accounts were picked up by newspapers in other cities and widely quoted as evidence of the callousness

and irresponsibility of the city's residents. Mayor Crossman, an excellent administrator, acted as soon as the matter was drawn to his attention, and the crisis was solved almost before the exaggerated tales of New Orleans' depravity began to spread through the United States.⁸

In August, as the disease reached its peak, the mayor desperately seized upon any and all suggestions. Up to this time he had concentrated upon attempting to clean and drain the city. Huge quantities of quicklime had been spread in the gutters, privies, and sewers and also were liberally sprinkled in the graveyards and on the bodies of the dead; the rooms and buildings in which the sick had died had been cleansed and fumigated; and pools of stagnant water had been drained and filled. At the suggestion of the Board of Health, on August 18 Mayor Crossman ordered the firing of cannon at sunrise and sunset in various sections of the city. A local artillery company set up its 6-pound cannon in the public square and fired them twice daily. In addition, barrels of tar were placed at street corners and burned during the night.⁹ Precisely what effect the roaring of the cannon and the leaping flames from the tar barrels must have had upon the frightened populace is hard to say, but the acrid smell of burnt gunpowder and the black smoke from the tar must have made the hot blanket of moist air which had settled over New Orleans in that unusually hot summer even more oppressive than usual.

The peak of the epidemic of 1853 was reached on August 21 when more than 300 burials were reported in a single day. By the end of the month the deaths had fallen to well below 200 per day and the worst was over. When the Board of Health compiled its final mortality statistics, it was discovered that about 11,000 residents had died in a five-month period. To appreciate the magnitude of the disaster, one has only to realize that thousands of refugees had been added to the normal summer migration, reducing the population to less than 100,000.^{3, 10}

Although New Orleans, because of its size and its role as the major southern port, bore the brunt of these onslaughts, the pattern established there by the disease was duplicated in dozens of other coastal towns and cities. Charleston, S.C., almost a thousand miles away on the Atlantic coast and only a third as large as New Orleans, witnessed a strikingly similar pattern of outbreaks. A series of epidemics struck in the 1790's and in the opening years of the 19th century. After being plagued in 1804, 1807, and 1809, the city remained free of the fever

until 1817. As with New Orleans, severe attacks in 1817 and 1819 were followed by a constant succession of epidemics; a few cases developed nearly every summer and fall in the intervening years. Here, too, the peak was reached in the 1850's. In 1854, of a population of less than 50,000, a total of 675 deaths were recorded. Four years later, in 1858, the death toll climbed to 717.¹¹

The most northerly ports to suffer from yellow fever epidemics in the years after 1822 were the two adjacent towns of Norfolk and Portsmouth in Virginia. Norfolk, which bore the brunt of the attacks, endured a series of epidemics starting in the 1790's, saw the disease relax its grip in the second quarter of the 19th century, and then experienced one final devastating blow in 1855. At the time of this epidemic Norfolk and Portsmouth had a combined population of between 25,000 and 30,000. Almost half the townspeople fled during the early days of the outbreak. Nearly all of the 15,000 who remained came down with the disease and the combined number of deaths was close to 3,000. The Negro population, which had some degree of immunity, did not escape the infection, but it did have a low case-fatality rate; hence the major share of the losses was borne by the whites. In Norfolk it was estimated that one third of the white population died in the course of the epidemic, and in Portsmouth more than 40 per cent of the whites fell victims to the disease.¹²

North Carolina, immediately to the south of Virginia, had no large cities but several outbreaks of yellow fever struck Wilmington from 1796 to 1862, and, on occasion, New Bern and other towns were affected. Georgia, below the Carolinas, had only one major port, Savannah. Like Charleston, it was afflicted with a series of yellow fever epidemics from 1800 to 1858.¹³ Because the Atlantic coast of Florida was sparsely settled and had no major ports, it escaped much of the yellow fever, but the two towns of St. Augustine and Jacksonville suffered occasional epidemics in the years prior to the Civil War. However, Key West, off the tip of the Florida peninsula, and Pensacola, on the Gulf coast, were frequently visited by the disease. The history of yellow fever in Pensacola is a repetition, on a smaller scale, of what was happening in New Orleans and, indeed, along the whole Gulf coast.¹⁴

From 1820 to 1860 almost every town on the Gulf coast lived in terror of yellow fever, a fear that was enhanced as the disease steadily

intensified its attacks. Cities such as Mobile, Gulfport, New Orleans, Galveston, and other Texas ports westward to Brownsville, as well as towns located on the Mississippi River and its tributaries, could expect recurrent visits from yellow fever.

Almost as soon as Texas was settled by Americans, the disease appeared. In 1839, when yellow fever struck the city of Galveston, the young republic of Texas had only recently gained its independence; Galveston itself, with a population of just over 2,000, was barely two years old. This one outbreak killed off a tenth of the population. For the rest of the 19th century, with only a few minor exceptions, whenever a major yellow fever epidemic broke out in New Orleans, the cities of Galveston and Houston were nearly certain to feel the weight of the disease.¹⁵

Fortunately for the United States, yellow fever reached its peak during the 1850's and the succeeding years saw a sharp reduction in the number and severity of the outbreaks. The city of New Orleans, without doubt the chief victim of yellow fever, escaped from 1859 to 1867 with only a few sporadic cases. In the latter year a major epidemic involving more than 40,000 cases and 3,100 deaths swept through the city. A few scattered cases appeared in 1868 and 1869, and the following year the disease again flared up in epidemic proportions, killing almost 600 citizens. Throughout the 1870's cases appeared every summer, but only twice did the disease become epidemic, in the years 1873 and 1878. On the first occasion the death toll slightly exceeded 200, but the 1878 epidemic was the third worst in the history of the city. From July to December some 27,000 people sickened and over 4,000 succumbed to the disease.²

As in previous years, a few yellow fever cases continued to be diagnosed almost every summer, but New Orleans had seen the last of the great epidemics. In 1897, at a time when the city's residents were convinced that these outbreaks were a thing of the past, the disease flared up once more. On this occasion 2,000 cases resulted in about 300 deaths. After another brief respite, the disease again struck with epidemic force in 1905. By this time the role of the *Aedes aegypti* was clearly understood, and concerted action by city, state, and federal authorities led to an effective program for eradication of mosquitoes. Whereas former epidemics in New Orleans had reached their peak in August and September, the 1905 epidemic was cut short before the end

of August. Even so, this last outbreak of yellow fever in the United States brought death to 452 of the 3,402 residents who contracted the disease.^{2, 16}

As in the first six decades of the century, the pattern of epidemics in New Orleans in the post-Civil War years was repeated in the other Southern port cities. While no city equaled New Orleans in this respect, yet the epidemic years there generally coincided with the periods of widespread attacks of yellow fever. With a few exceptions, yellow fever was not too much of a problem during the Civil War, 1861 to 1865. The effectiveness of the Northern blockade of Southern ports and the disruption of normal trade relations undoubtedly played a role in keeping yellow fever to a minimum.¹⁷ The chief epidemics of the war years occurred in Charleston, S.C.; Wilmington and New Bern, N.C.; Pensacola and Key West, Fla.; and Galveston, Texas. Following the war, the disease struck in desultory fashion in 1866 and then appeared widely along the Gulf coast in 1867, one of the major yellow fever years. From Pensacola to Brownsville, Texas, almost every town was affected. After a four-year lull, the pestilence returned in 1871 and again in 1873. In neither of these years, however, was it as widespread or as severe as in 1867.

During the 1870's cases were reported nearly every summer in many of the Gulf coast towns, but the disease did not generally become epidemic until the summer of 1878, a significant year in the annals of yellow fever. The distinguishing characteristic of this outbreak was that it swept far up the Mississippi River. Almost from the beginning of the 19th century river boats had spread yellow fever from New Orleans to the many river towns in Louisiana and Mississippi. Natchez, Miss., more than 200 miles up the river from New Orleans, was first attacked in 1817 and suffered repeatedly in the succeeding years. Vicksburg, further north, witnessed its first outbreak in 1841.

By the 1870's the extension of railway lines and the development of faster steamboats, abetted by the gradual spread of the *Aëdes aegypti*, paved the way for yellow fever to reach as far north as St. Louis. The epidemic of 1878 struck first at Baton Rouge and Vicksburg, then pushed on to Memphis, and to Cairo, Ill.; eventually it reached St. Louis. At the same time the disease was carried up the Tennessee River to Chattanooga, and up the Ohio River as far as Louisville. The worst impact of the disease was felt by Memphis, which had a population of

about 35,000. Memphis suffered 15,000 yellow fever cases and had about 3,500 dead.¹⁸ Vicksburg, another town to feel the full weight of the epidemic, reported more than 3,000 cases and more than 1,000 deaths in a population of about 12,000

Never before had the disease spread so far into the interior, and it brought home to millions of Americans the need for effective quarantine laws. As will be seen later, widespread pressure for the first time was exerted to bring action at the national level. Although the fever returned on a small scale to New Orleans, Memphis, and a number of other cities in 1879, no serious epidemic developed. The 1878 outbreak proved to have been the culmination of the series of attacks that started about 11 years earlier. Throughout the 1880's and early 1890's, the United States enjoyed relative freedom from yellow fever. Scattered cases appeared here and there, but with the exception of an outbreak in Florida in 1888, the disease did not reach major epidemic proportions. The Florida epidemic, which was centered around Jacksonville on the Atlantic coast, ranged as far as 70 miles inland to the town of Gainesville and 40 miles north to the community of Fernandina. Before cool weather halted the disorder, the cases numbered in the thousands and deaths in the hundreds. Fortunately, as far as Florida was concerned, this 1888 outbreak closed the history of yellow fever.^{14, 19}

The final years of the pestilence in New Orleans were those in which the disease was widely prevalent in the Mississippi Gulf coast and Delta regions. A series of mild outbreaks characterized the three years from 1897 to 1899, and the summer of 1905 saw minor epidemics in Vicksburg, Natchez, and Gulfport. In all likelihood, these attacks were directly related to the epidemics in New Orleans, since that city was usually the focal point of infection. In any event, the 1905 epidemics signaled the end of yellow fever in the United States.¹⁶

For 212 years, from 1693 to 1905, yellow fever had plagued the territory of the present United States. With the exception of the 1878 outbreak, the disease generally had been limited to coastal towns and cities and to the lower Mississippi Valley. In the 18th century the only large areas of settlement were on the Atlantic coast, and it was here that the disease struck. In the 19th century the settlement of Florida and the gulf coast states created a new and even more fertile field for yellow fever. The semitropical climate was better suited for the *Aedes aegypti*, and the mosquito thrived in the warm moist climate. Moreover, New

Orleans in particular, and other Gulf ports, developed a prosperous trade with Europe and the Caribbean area. Sailing vessels on the long voyage from Europe to the Gulf coast were almost forced to stop for water and food at one of the West Indian ports where the chances of infection were high. Thus the stage was set for the repeated introduction of yellow fever into the Gulf coast area.

Meanwhile the more northerly cities on the Atlantic coast were instituting rigid quarantine measures and at the same time were improving drainage and sewerage facilities. These efforts, in conjunction with the shorter summers, which limited the activities of mosquitoes, all contributed to eliminating yellow fever as an epidemic disease in the central and northern Atlantic coast region.

As Dr. Blake has shown, the great epidemic periods of yellow fever in the United States during the 18th century coincided with those periods when the disease was rampant in the Caribbean area. It is clear, too, that its spread to the mainland of North America was conditioned by political and economic considerations. A fairly close correlation exists between the European and colonial wars and the existence of yellow fever in North America. The second One Hundred Years' War between England and France was fought on a wide front, which included the West Indies and all of North America. It began in 1689 with the War of the League of Augsburg and ended with the Napoleonic Wars in 1815. It was more than a coincidence that the first yellow fever epidemics in British North America came during the years from 1693 to 1710, a period which included the War of the League of Augsburg and the War of the Spanish Succession. The disease reached a peak in the 1740's and temporarily halted its depredations in 1762. Significantly, the second series of wars between England and France was fought from 1740 to 1763. The next period in the history of yellow fever in America began in 1793 and lasted to 1805. Here again the date of its beginning coincides with the opening of the War of the French Revolution, and the closing date, 1805, was the year in which Nelson swept the French fleet from the high seas; this gave England virtual control of the oceans for the remainder of the Napoleonic Wars.

By 1815 the United States had fought its second battle for independence from England; although it had not won the War of 1812, it had permanently severed the umbilical cord that bound it to England. Henceforth it was no longer a pawn in the European power struggles.

As a growing commercial nation, its trade with the West Indies steadily expanded, and this facilitated the importation of tropical diseases. The Civil War, as noted earlier, drastically reduced the commercial activities of southern ports and may have been a major factor in ending the devastating outbreaks of yellow fever which had characterized the preceding 10 years. The Spanish-American War, which led to the American occupation of Cuba, a major focal point of yellow fever, may have been responsible for the final series of outbreaks in the United States.

Whatever may be the epidemiological implications of the rise and fall of yellow fever, the recurrent epidemics had a profound impact upon the development of medical thought and preventive medicine in the United States. The first epidemics of yellow fever in the late 17th and early 18th century, which came at a time when smallpox was also threatening, contributed to the creation of some of the early quarantine laws. Massachusetts, for example, passed a law in 1699 designed to prevent ships carrying infected persons or persons coming from ports where contagious diseases were prevalent from landing in the colony. When the British government disallowed this measure, the colonial legislature resolved the matter by authorizing justices of the peace to prohibit individuals from disembarking.²⁰

When the fever returned in a more serious form at the end of the 18th century, it touched off a public debate which was to last for a hundred years: Was yellow fever a specific infection, contagious and imported, or was it a noncontagious fever generated in filth and putrefying substances? The public was inclined to the theory that it was a specific and contagious disorder, whereas the medical profession generally supported the anticontagion viewpoint. The result was that both sides gained some concessions. Most of the early health boards were essentially quarantine agencies. The evidence that dirt and disease went hand in hand, however, was all too obvious, and the anticontagionists or sanitationists could always find strong support. Moreover, from an esthetic standpoint, there was much in favor of a cleaner and more sanitary city.

Rudimentary quarantine and sanitary regulations existed in nearly all American ports by 1790, but the disastrous onslaughts of the fever during the next few years gave a sharp impetus to developments in public health. In direct response to the first major epidemic in 1793,

the state legislature authorized a board of health in Philadelphia.²¹ In other states, too, legislatures and city councils responded to attacks of yellow fever by passing public health legislation; health boards and health commissions were established in New York and Baltimore; in Charleston quarantine powers were invested in the city council; and in New Orleans the Spanish governor and attorney general instituted rigorous quarantine measures and recommended draining stagnant pools and cleaning the city streets.^{22, 1}

In the United States, as elsewhere, major epidemics usually crystallized the growing sentiment for public health reform and often led to remedial action. For much of the United States in the 19th century, Asiatic cholera supplied this impetus, but in the Southern states the role was played by yellow fever. Repeated epidemics led to the creation of many temporary health boards in New Orleans and other Gulf coast towns. The devastating Louisiana epidemic of 1853, which was followed immediately by two more severe outbreaks, was the prime factor in the creation in 1855 of the Louisiana State Board of Health, the first of its kind in the United States.²³ This board was intended to serve as a quarantine agency, but its members soon expanded their activities to include a wide variety of sanitary matters.

The widespread epidemic of 1878 not only strengthened and promoted state and local health boards, but was also responsible for the first attempt to create a United States health department. Virtually all of the states affected by the disease in the Mississippi Valley blamed the Louisiana State Health Board for permitting the disease to gain a foothold. This accusation was unfounded. In the first place the Louisiana board was using the best available methods to keep the disease out of New Orleans, and in the second place Louisiana had an even more vital stake in holding yellow fever at bay than any other state. Nonetheless, responding to pressure from many parts of the country, Congress in 1879 created the National Board of Health.* This board, which survived only about four years, was intended to establish a national quarantine system. Almost immediately it ran afoul of municipal and state health boards, which were reluctant to see their authority superseded and at the same time, the national board encountered sharp opposition from the United States Marine Hospital Service, which felt

*It was this board which in 1879 sent a commission on yellow fever to Havana. One of the Cubans assigned to work with the commission was Carlos J. Finlay, who two years later first pinpointed the *Aedes aegypti* mosquito as the vector of yellow fever.

its interests threatened by the new agency. The medical profession, too, was divided over the need for a national quarantine agency. With the causative agent and the means of transmission of yellow fever a complete mystery, the medical profession was still debating the issue of quarantine versus sanitation, and it was in no position to take a firm stand in favor of a quarantine program. For these and other reasons this first national health agency soon fell by the wayside. However the lesson was not completely lost, for within less than 20 years the United States was to take another major stride in the development of a national public health program.

By 1878 the movement towards city and state health departments was well under way in the United States. The epidemic of yellow fever of that year was in no sense a precipitating element, but it did give the movement further impetus. The correlation between epidemics of yellow fever and the emergence of health boards was particularly true of the Southern states. For example, the Florida State Board of Health was a direct result of the 1888 outbreak. Although the newly created health boards could take only limited action against the danger from the disease, these health agencies were well organized by the time the role of the mosquito was established. Thus, as the epidemic of 1905 demonstrated, governmental health organizations were fully prepared to eradicate yellow fever once the means of its transmission was discovered.

The precise long-range effects of yellow fever upon the United States are difficult to assess. The repeated and devastating attacks upon New Orleans, which suffered the worst depredations in the 19th century, did not stop the city from becoming the chief entrepôt and commercial emporium of the South. Despite the ravages of the disease along the Gulf coast, cities and towns rapidly emerged, consolidated their gains, and increased in population and wealth. Nevertheless, many European immigrants did avoid southern ports, and there can be no doubt that the terrible epidemics of yellow fever retarded the development of the southern coastal cities.

The emergence of effective public health programs in the United States was obviously the result of many factors: the rising standards of living, the advancing front of medical and scientific knowledge, an increasing sensitivity to human misery, and the development of more effective government. Yellow fever and Asiatic cholera, the two most

significant plagues in 19th century America, accentuated and sharpened social awareness of problems in public health. As already shown, specific epidemics were responsible for focusing attention upon needs in public health and for bringing pressure to bear upon legislative bodies. Reforms were in the making, but yellow fever was often the precipitating factor which hastened the change.

REFERENCES

1. Duffy, J., ed. *The Rudolph Matas History of Medicine in Louisiana*, vol. 1, Baton Rouge, Louisiana State Univ. Press, 1958.
2. Duffy, J., ed. *The Rudolph Matas History of Medicine in Louisiana*, vol. 2, Baton Rouge, Louisiana State Univ. Press, 1962.
3. Duffy, J. *Sword of Pestilence*. Baton Rouge, Louisiana State Univ. Press, 1966.
4. *Cohen's New Orleans Directory for 1853*. New Orleans, 1853.
5. Duffy, J. A Sidelight on Colonial Newspapers, *Historian* 18:230-48, 1956.
6. New Orleans City Council, Board of Aldermen, *Proceedings*, July 22, 1853. *New Orleans Daily Picayune*, July 24, 1853.
7. *New Orleans Bee*, July 26, 1853.
8. *New Orleans Daily Delta*, August 8, 9, 1853; *New Orleans Daily Picayune*, August 8, 1853.
9. *New Orleans Daily Picayune*, August 19, 1853.
10. Fenner, E. D. *History of the Epidemic of Yellow Fever at New Orleans, Louisiana, in 1853*. New York, Hall and Clayton, 1854.
11. Waring, J. I. *A History of Medicine in South Carolina, 1670-1825*. Columbia, Univ. South Carolina Press, 1964.
12. Blanton, Wyndham B., *Medicine in Virginia in the Eighteenth Century*. Richmond, Garret and Massie, 1931; Forrest, W. S., *The Great Pestilence in Virginia . . . Yellow Fever in Norfolk and Portsmouth in 1855*. New York, Darby and Jackson, 1856.
13. Coulter, E. M. *Georgia, A Short History*. Chapel Hill, Univ. North Carolina Press, 1947.
14. Patrick, R. W. *Florida Under Five Flags*. Gainesville, Univ. Florida Press, 1945.
15. Smith, A. *Yellow Fever in Galveston, Republic of Texas, 1839*. Leake, C. D., ed. Austin, Univ. Texas Press, 1951; Dowell, G. *Yellow Fever and Malarial Diseases Embracing a History of Yellow Fever in Texas*. Philadelphia, Med. Pub. Office, 1876.
16. Carrigan, J. A. Yellow fever in New Orleans, 1905: the last epidemic. *Bull. Tulane Med. Fac.* 26:19-28, 1967.
17. Carrigan, J. A. Yankees versus yellow jack fever in New Orleans, 1862-1866, *Civil War History* 9:248-60, 1963.
18. Keating, J. M., *A History of the Yellow Fever: The Yellow Fever Epidemic of 1878 in Memphis, Tennessee*. Memphis, Howard, 1879; Ellis, J. H., Memphis' sanitary revolution, 1880-1890, *Tennessee Hist. Quart.* 23:59-72, 1964.
19. *Report of the Jacksonville Auxiliary Sanitary Association of Jacksonville, Florida . . . during the Yellow Fever Epidemic, 1888*. Jacksonville, Times-Union, 1889.
20. Blake, J. B. *Public Health in the Town of Boston, 1630-1822*. Cambridge, Harvard Univ. Press, 1959; Duffy, J. *Epidemics in Colonial America*. Baton Rouge, Louisiana State Univ. Press, 1953.
21. Mansfield, M. A. F., Yellow Fever Epidemics in Philadelphia, 1699-1805. Unpublished M. A. Thesis, University of Pittsburgh, 1949.
22. Howard, W. T., *Public Health Administration and the Natural History of Disease in Baltimore, Maryland, 1797: 1820*. Washington, Carnegie Inst., 1924.
23. Freedman, B. The Louisiana State Board of Health, Established 1855. *Amer. J. Public Health* 41:1279-1285, 1951.